BARVINSKIY, S.R., kand. med. nauk; URIN, V.M., kand. med. nauk (L'vov)

Examination of mucoproteins in the blood of thyrotoxicosis patients. Probl. endok. i gorm. 9 no.6:61-64 N-D '63. (MIRA 17:11)

1. Iz kafedry gospital'noy terapii (zav. - dotsent I.I. Markov) i kafedry biokhimii (zav. - prof. V.A. Sobchuk) L'vovskogo meditsinskogo instituta (rektor - prof. L.N. Kuzmenko).

BARVIR, J.; FUNFALEK, A.

Salt content in smoked food products. p. 533

PRUMYSL POTRAVIN. (Ministerstvo potravinarskeho prumyslu)
Praha, Czeckoslovakia Vol. 10, no.10, Oct. 1959

Monthly List of East European accession, (EEAI), LC, Vol. 8, No. 12, Dec. 1959
Uncl.

BARVIR, Josef, inz.

Organoleptic examination of food, and its organization in Czechoslovakia. Prum potravin 15 no.11:548-551 N '64.

1. State Inspection of Food Industry Product Quality, Prague.

Card 2/8

PROCHAZKA, V., inz.; BARVIR, V.

Revision of Czechoslovak Standard 38 5524/I on determining sulfur in fuel gas. Paliva 43 no.4:124-126 Ap '63.

[illegible]

Some derivatives of benzothiazole. Part 3.
2, 5, 6, and 2, 6, 7-trimethylbenzothiazoles.
Zhur. ob. khim. 22(84) no. 3, March 1952
Vsesoyuznyy Nauchno-Isslesovatel'skiy
Kino-Fotoinstitut

2
SO: Monthly List of Russian Accessions, Library of Congress, August 1952, Uncl.

Chemical Abstracts
Vol. 48 No. 5
Mar. 10, 1954
Photography

Cyanine dyes. VII. The properties of tetramethylthiacarbocyanines. A. I. Levkoev, A. P. Vompe, N. N. Sveshnikov, and S. S. Barvyn. J. Gen. Chem. U.S.S.R. 22, 939-44(1952)(Engl. translation).—See C.A. 46, 10985g.
H. L. H.

at 140 60°, cooling [illegible]

Investigations in the Field of Cyanine Dyes. XII. Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

77403
SOV/79-30-1-64/78

2-methyl-6-methylaminobenzothiazole (III) (by boiling compound (II) dissolved in HCl and subsequent neutralization) (mp 92-93°); and 2-methyl-6-N-methyl-N-acetylaminobenzothiazole (IV) (by heating the mixture of (III) and acetic anhydride with subsequent alkalization) (mp 105-106°). The 6,6'-diacylamino-, 5,5'-dimethoxy-6,6'-diacylamino-, and -6,6'-bis(dimethylamino) thiacarbocyanines were prepared by heating corresponding substituted 2-methylbenzothiazoles with ethyl or methyl p-toluenesulfonate. The quaternary salt thus obtained was mixed with orthoformate esters and pyridine and heated at 130-135°. The precipitate formed, after dilution of the reaction mass with ether, was dissolved in alcohol, and the cyanine was precipitated with aqueous KBr, KI, or NaCl. The following dyes were investigated spectrophotometrically (in ethanol, using SF-2 spectrophotometer): 3,3'-diethyl-5,5'-dimethoxy-6,6'-bis(dimethylamino)thiacarbocyanine iodide (1) (yield 16%, mp 211-212°, λ_{max} 604); 3,3'-diethyl-9-methyl-5,5'-dimethoxy-6,6'-bis(dimethylamino)thiacarbo-

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cyanine perchlorate (2) (yield 15%, mp 170°, λ_{max} 588); its 3,3',9-triethyl derivative (3) yield 10%, mp 167-168°, λ_{max} 592); 3,3'-diethyl-5,5'-dimethoxy-6,6'-diacetylaminothiacarbocyanine bromide (4) (yield 40%, mp 270-272°, λ_{max} 598); its 3,3'-diethyl-9-methyl derivative (5) (yield 26% mp 262-264°, λ_{max} 578); its 3,3'-9-triethyl derivative (6) (yield 19%, mp 215-216°, λ_{max} 582); its 3,3'-dimethyl-9-ethyl derivative (7) (yield 35%, mp 243-245°, λ_{max} 578); 3,3'-diethyl-5,5'- dimethoxy-6,6'-bis(N-methyl-N-acetylamino)thiacarbocyanine iodide (8) (yield 28%, mp 294-295°, λ_{max} 583); its 3,3'-diethyl-9-methyl derivative (9) (yield 25%, mp 292-294°, λ_{max} 565); its 3,3'-9-triethyl derivative (10) (yield 33%, mp 258-259°, λ_{max} 568); 3,3'-diethyl-5,5'-

dimethoxy-6,6'-di(p-toluenesulfamylamino)thiacarbocyanine bromide (11) (yield 76%, mp 210-212°, λ_{max} 592); 3,3'-diethyl-5,5'-dimethoxy-6,6'bis(N-methyl-N-p-toluenesulfamylamino)thiacarbocyanine bromide (12) (yield 48%, mp 250-252°, λ_{max} 585); 3,3'-diethyl-6,6'-bis(N-methyl-N-acetylamino)thiacarbocyanine iodide (13) (yield 94%, mp 264-265°, λ_{max} 564); 3,3'-diethyl-9-methyl-6,6'-bis(N-methyl-N-acetylamino)thiacarbocyanine perchlorate (14) (yield 48%, mp 232-234°, λ_{max} 552); its 3,3',9-triethyl derivative (15) (yield 56%, mp 233-234°, λ_{max} 555), 3,3'-diethyl-6,6'-di(p-toluenesulfamylamino)thiacarbocyanine p-toluenesulfonate (16) (yield 74%, 280-282°, λ_{max} 572); and 3,3'-diethyl-6,6'-bis(N-methyl-N-

Investigations in the Field of Cyanine Dyes. XII, Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

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-p-toluene-sulfamylamino)thiacarbocyanine iodide (17) (yield 75%, mp 228-230°, λ_{max} 568). The 6,6'-bis(N-methyl-N-acetylamino derivatives were prepared by heating respective iodides of 6,6'-bis(methylamino) derivatives with acetic anhydride and subsequent addition of ether, alcohol, and KI solutions to the cooled reaction mass. The 6,6'-bis(methylamino) derivatives were made by boiling iodides of 6,6'-bis-(N-methyl-N-p-toluenesulfamylamino)thiacarbocyanine derivatives with HCl. The general formulas of the above compounds are shown below.

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Investigations in the Field of Cyanine Dyes. XII. Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

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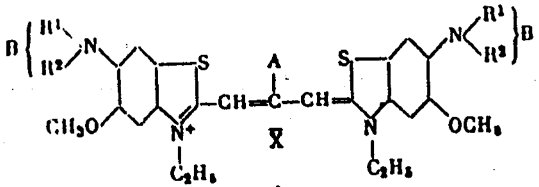
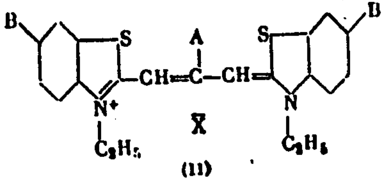
SOV/79-30-1-64/78



(I)



(II)

Table 1 gives the absorption maxima for some of the cyanine dyes (I and II, A = H) with the shifts of λ_{max}.

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Investigations in the Field of Cyanine Dyes. XII. Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

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Table 1

Substituents in 6,6'-positions	Absorption maximum (mμ)			Shift in λ_{max} in comparison with the unsubstituted carbocyanine (in mμ)	Calculated for (I) additive shift (in mμ)	Deviation of the λ_{max} of dye (I) from the calculated (in mμ)
	(I)	(II)				
		our data	Literature data			
H	576	558	—	18	—	—
NH_2	616	594	596 597	58	54	+4
CH_3NH	630	608	610	72	68	+4
$(CH_3)_2N$	604	612	612	46	72	−26
CH_3CONH	598	577	581 579	40	37	+3
$CH_3CON(CH_3)$	583	564	—	25	24	+1
p $CH_3C_6H_4SO_2NH$	592	572	577 578	34	32	+2
p-$CH_3C_6H_4SO_2N(CH_3)$	585	568	570	27	28	−1

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Investigations in the Field of Cyanine Dyes. XII. Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

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It can be seen that introduction of methoxy groups in 5,5'-position of the 6,6'-disubstituted thiacarbocyanines, containing free or substituted amino groups, causes an additive (close to the calculated value) bathochromic shift of the absorption maximum in all cases, except for 6,6'-bis(dimethylamino) derivatives. This abnormality is explained by the appearance of steric hindrance to the planar arrangement of the molecule (the planar arrangement is required by the unsaturation between the nitrogen and carbon atoms-- $>N^+=C<$) upon introduction of the two methyl groups (see Fig. 1).

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Investigations in the Field of Cyanine Dyes. XII. Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

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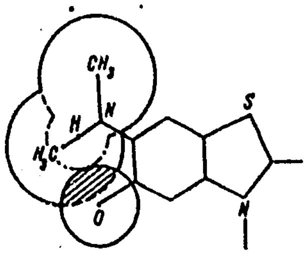

Fig. 1.

There are 2 tables; and 25 references, 19 Soviet, 1 Danish, 2 U.K., 3 U.S. The U.K. and U.S. references are: F. M. Hamer, J. Chem. Soc., 1927, 2798, 1928, 3160, W. R. Remington, J. Am. Chem. Soc., 67, 1838 (1945); N. F. Hall, M. R. Sprinkle, J. Am. Chem. Soc., 54, 3469 (1932); L. P. Hammett, M. A. Paul, ibid., 56, 827 (1934); C. E. Ingham, G. C. Hampson, J. Chem. Soc., 1939, 981; P. W. Vittum, G. H. Brown, J. Am. Chem. Soc., 68, 2235 (1946).

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Investigations in the Field of Cyanine Dyes. XII. Concerning Some 5,5'-Dimethoxy-6,6'-Diaminothiacarbocyanines

77403
SOV/79-30-1-64/78

ASSOCIATION: All-Union Scientific Research Motion Picture and Photography Institute (Vsesoyuznyy nauchno-issledovatel'skiy kinofotoinstitut)

SUBMITTED: October 21, 1958

Card 10/10

LEVKOYEV, I.I.; SVESHNIKOV, N.N.; GIPP, N.K.; DURMASHKINA, V.V.; BARVYN', N.S.

Studies in the field of cyanine dyes. Part 14: Some thiacarbocyanines containing ethyl or isopropyl groups in the heterocyclic residues. Trudy NIKFI no.40:5-11 '60. (MIRA 15:2)
(Cyanines)(Dyes and dyeing)

BARWICZ, Wieslaw; HENNEL, Jan

Electronic tubes. Przegl elektroniki 3 no.3:111-114 Mr '62

42967
S/058/62/000/011/033/061
A160/A101

93780

AUTHOR: Barwicz, Wieslaw

TITLE: An electron tube for pulsing

PERIODICAL: Referativnyy zhurnal, Fizika, no. 11, 1962, 23, abstract 11-3-45a ("Prace Przemysl. inst. elektron.", no. 3, 1961, 2, 80 - 84, Polish)

TEXT: The Przemyslowy Inst. Electroniki (ПНР) (Przemysl Electronics Institute (Poland)) developed a tube which practically replaces a common pulsing circuit. In addition to the cathode and anode, the tube contains 5 grids and 2 input electrodes to which a voltage (for instance, a sinusoidal one) is fed, that is symmetrically converted into pulses. The pulses (for instance, triangular ones) are taken from the output resistance. The magnitude of these pulses depends on the voltage applied to one of the grids, serving as a control grid (fed, in distinction to the other ones, with a negative voltage). When properly selecting the positive voltages on the other grids, this relation may be made linear.

N. S.

[Abstracter's note: Complete translation]
Card 1/1

42968

S/058/62/000/011/034/061
A160/A101

9,3[illegible]

AUTHOR: Barwicz, Wieslaw

TITLE: A method of obtaining pulses of a definite shape, and an electron tube with the help of which these pulses are obtained

PERIODICAL: Referativnyy zhurnal, Fizika, no. 11, 1962, 23, abstract 11-3-45s P (Pol. pat., cl. 21g, 13/22, no. 45447, Febr. 24, 1962)

TEXT: A design of a multi-electron tube, which replaces almost all circuit elements of a pulse generator, is patented. The method of pulsing is based on the irising of the band-shaped electron beam with the screening electrode. The pulse frequency depends on the frequency of the symmetrical alternating voltage applied to the deflecting plates of the tube. The shape of the pulses is determined by the shape of the opening in the screening electrode.

N. S.

[Abstracter's note: Complete translation]

Card 1/1

BARWICZ, Wieslaw

Electron tube for definite shape pulse generating. Przegl elektroniki 3 no.12:707-709 D '62.

1. Katedra Elektroniki, Politechnika, Wroclaw.

S/274/63/000/002/008/019
A055/A126

S/274/63/000/002/008/019
A055/A126

Tube for digital voltmeters

BARWICZ, Wieslaw; LEWKO, Jan

New method of measuring direct voltage with the digital indicator. Przegl elektroniki 4 no. 2: 117-120 '63.

1. Katedra Elektroniki, Politechnika, Wroclaw, i Przemyslowy Instytut Elektroniki, Warszawa.

BARWICZ, Wieslaw; HALAS, Andrzej; SZRETER, Miroslaw; PAWLOW, M.

Studies on cold cathodes. Przegl elektroniki 4 no.4:240-242 Ap '63

1. Katedra Elektroniki, Politechnika, Wroclaw.

BARWICZ, W.; SZYMANSKI, H.

Influence of the characteristic pole piece dimensions on the parameters of a magnetic objective. Przem inst elektron prace 5 no.1:13-20 '64.

1. Submitted February 7, 1964.

BARWICZ, W.; BARYCKA, I.; MORAW, M.; SZRETER, M.

Better vacuum by using zeolites. Przem inst elektron prace 5 no.1: 77-79 '64.

1. Submitted February 7, 1964.

BARWICZ, W.

Device for measuring the distribution of the current density in an electron beam. Przem inst elektron prace 5 no.2:155-158 '64.

1. Submitted June 15, 1964.

L 20857-66 EWP(1) IJP(c) GG/BB

ACCESSION NR: AP5014050

PO/0034/65/000/005/0223/0224
621.374.32

AUTHOR: Barwicz, W. (Docent); Libura, A. L. (Master engineer)

TITLE: The Convertron - an electronic analog-to-digital converter

SOURCE: Pomiary, automatyka, kontrola, no. 5, 1965, 223-224

TOPIC TAGS: analog digital converter, electronic converter, electron beam, converter, converter design/Convertron

ABSTRACT: This paper describes a new type of analog-to-digital converter which was designed at the Department of Electronics of Wroclaw Polytechnic Institute and fabricated at the Industrial Institute of Electronics in Warsaw. The device can be used for repetitive measurement of voltages. The construction of the device, shown in Fig. 1 of the Enclosure, is similar to that of an ordinary cathode-ray tube. It operates as follows: The electron beam generated by a conventional electron-optical system is incident on an electrode designated as a "dynode". The dynode, shown in Fig. 2, consists of two elements. Element I is in the form of a ladder made, for example, of a metallic perforated tape of a material having a secondary-emission coefficient σ_1 much greater than 1 while element II is an unperforated tape made of a material having a secondary emission coefficient σ_2 much less than 1. The two

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ACCESSION NR: AP5014050

2

elements are welded together and are located inside the collector. The electron beam is deflected by the measured voltage applied to the deflecting plates. The whole structure is placed inside [illegible]. The operation is based on the generation of current pulses when the electron beam, controlled by the measured voltage, is incident successively on the alternating dynode elements having different coefficients of secondary emission. A detailed analysis of the operation of the device is presented. The method of measuring the converting speed of the device is discussed, and a schematic of the measurement setup is shown. The converting speed of two prototype samples having dynodes of 100 sections and a voltage range of 150 v was determined to be 200 kc ± 5% for a height of output pulses of 10 mv ± 5%. It is noted that the converter has a strictly limited converting speed. "The authors acknowledge the help of Eng. Jan Lewko in solving many problems encountered in this work." Orig. art. has: 5 figures and 10 formulas. [08]

ASSOCIATION: (Barwicz) Katedra Elektroniki Politechniki Wroclawskiej (Department of Electronics, Wroclaw Polytechnic Institute); (Libura) Instytut Automatyki PAN (Institute of Automation, PAN)

SUBMITTED: 00 ENCL: 02 SUB CODE: DP, EC

NO REF SOV: 000 OTHER: 001 ATD PRESS: 4055

Card 2/4

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ACCESSION NR: AP5014050

ENCLOSURE: 01

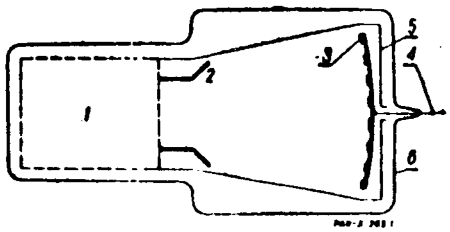

Fig. 1. Construction of the Convertron

1 - Electron-[illegible] system; 2 - deflecting plates; 3 - [illegible] dynode output; [illegible] - collector; [illegible] envelope.

ACCESSION NR: AP5014050

ENCLOSURE: 02

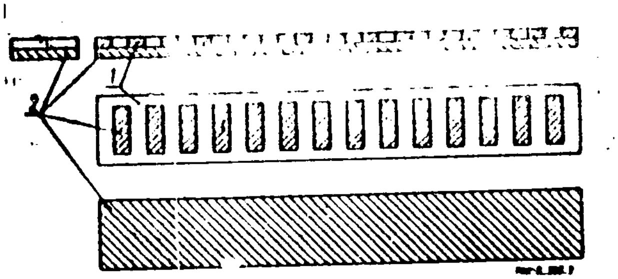

Fig. 2. Construction of the dynode

1 - Element of the I dynode (σ_1): 2 - element of the II dynode (σ_2).

Card 4/4

BARWIK-SCHRAMM, Alicja; MOL, Anna

[redacted]

Effect of vitamin E on efficiency of the skeletal muscles and general conditions in chronic progressive rheumatism. Polskie arch. med. wewn. 27 no.3:301-310 1957.

1. Z Panstwowego Instytutu Reumatologicznego w Warszawie Dyrektor: prof. dr. med. E. Reicher Oddzial w Krakowie: Dyrektor: prof. dr. med. A. Sabatowski Kierownik dzialu klinicznego: prof. dr. med. A. Sokolowski. Adres: Instytut Reumatologicny, Oddzial w Krakowie, Al. Puszkina 33.

(ARTHRITIS, RHEUMATOID, therapy,
    vitamin E, eff. on musc. efficiency & general cond. (Pol))
(VITAMIN E, therapeutic use,
    rheum. arthritis, eff. on musc. efficiency & general cond. (Pol))

Barwik-schramm, alicja

BARWIK-SCHRAMM, Alicja (Kratow, ul Spokojna 20 c m. 6.)

Observations on therapeutic action of gold salt in progressive chronic rheumatism. Polskie arch. med. wewn. 27 no.8:1035-1048 1957.

1. Z Panstwowego Instytutu Reumatologicznego Dyrektor: prof dr med. E. Reicher Odzial w Krakowie Dyrektor: prof. dr med. A Sabatowski Kierownik Dzialu Klinicznego: prof dr A. Sokolowski.

(ARTHRITIS, RHEUMATOID, therapy,
gold salts (Pol))
(GOLD, therapeutic use,
rheum. arthritis (Pol))

Barwik-Schramm, alicja

SOKOLOWSKI, Adam; MOL, Anna; BARWIK-SCHRAMM, Alicja

Modified iontophoresis of polocaine in rheumatic pains. Polskie arch. med. wewn. 27 no.12:1679-1682 1957.

1. Z Instytutu Reumatologicznego Dyrektor: prof. E. Reicher Oddzial Krakow, Dyrektor: prof. A. Sabatowski Kierownik Dzialu Klinicznego; prof. A. Sokolowski.

(ANALGESICS, therapeutic use,
    polocaine in rheum., iontophoresis (Pol))
(RHEUMATISM, therapy,
    polocaine iontophoresis (Pol))
(ION TRANSFER,
    iontophoresis of polocaine in rheum. (Pol))

EXCERPTA MEDICA Sec 19 Vol 3/3 Rehabilitation Mar 60

386. **The influence of vitamin E on the aldolase activity in rheumatoid arthritis** Wplyw witaminy E na czynnosc aldolazy w goscu przewleklym postepujacym. Barwik-Schramm A. and Dumanska K. Inst. Reumatol., Warszawa; Inst. Reumatol. Oddz., Krakow; Klin. Chor. Zakazn. A.M., Krakow *Pol. Arch. Med. wewnet.* 1959, 29/1 (35-42) Tables 3

Aldolase activity in the blood serum was investigated in 35 patients with rheumatoid arthritis, in the ages from 17 to 65 yr., and in 4 patients with other diseases. Lehlinger's method, modified by Bruns, was applied and the investigations were conducted before and after administration of vit. E. As a result there is to be noted a dependence between the degree of activity of the morbid process and the aldolase activity. In the cases with intensified inflammatory symptoms the administration of vit. E was followed by a fall of the aldolase activity, while in the 2nd group of patients, where a greater intensity of inflammatory symptoms had not appeared, the aldolase activity increased after the administration of vit. E. On the basis of these observations a normalizing influence of vit. E on the aldolase activity in rheumatoid arthritis may be supposed. VI, 19

BARWIK SCHRAMM, Alicja

Effect of chloroquine in chronic progressive rheumatism. Reumatologia Polska no.3:389-391 '60.

1. Z Instytutu Reumatologicznego w Warszawie Dyrektor: prof. dr med. E. Reicher Oddzial Krakow Dyrektor: prof. dr med. A. Sabatowski Kierownik dzialu klinicznego: prof. dr med. A. Sokolowski

(CHLOROQUINE ther)
(ARTHRITIS RHEUMATOID ther)

KOPERA, Zygmunt; BARWIK-SCHRAMM, Alicja

Dislocation of the atlas during the course of rheumatoid arthritis. Polski tygod.lek.15 no.9:315-319 29 F '60.

1. Z Instytutu Reumatologicznego; dyrektor: prof.dr.nauk med. E. Reichter, Oddzial w Krakowie: dyrektor: prof.dr.nauk med. A. Sabatowski; Kierownik Dzialu klinicznego: prof.dr.med. A. Sokolowski.
(ARTHRITIS RHEUMATOID comp.)
(ATLAS AND AXIS fract.& disloc.)

BARWIK-SCHRAMM, Alicja

Effect and significance of resochin in the treatment of chronic progressive rheumatism. Polskie arch. med. wewnetrz. 30 no.11: 1361-1367 '60.

1. Z Instytutu Reumatologicznego. Dyrektor: prof. dr med. E. Reicher Oddzial w Krakowie Dyrektor: prof. dr med. A. Sabatowski Kierownik Dzialu Klinicznego: prof. dr med. A. Sokolowski.

(CHLOROQUINE ther) (ARTHRITIS RHEUMATOID ther)

POLAND

BARWIK-SCHRAM, Alicja and SOKOLOWSKI, Adam; Institute of Rheumatology (Instytut Reumatologiczny) in Warsaw, Director: Dr Md Wl. BRUEHL and the Krakow Branch, Director: Prof Dr A. SOKOLOWSKI.

''Combined Treatment (Chloroquine, Aspirin and Prednisone) of Rheumatoid Arthritis''

Warsaw, Polski Tygodnik Lekarski, Vol XVIII, No 5, 28 Jan 1963, pp 170-173.

Abstract: [Authors' English summary modified] The results of combined treatment of rheumatoid arthritis are discussed. Clinical observations and laboratory findings are reported. Administration of small doses of prednisone together with resoquine and aspirin cause a rather rapid improvement and the side effects of corticotherapy are diminished. 2 diagrams; 22 item bibliography, mostly Western sources.

1/1

SOKOLOWSKI, Adam; ACKERMAN, Janina; BARWIK-SCHRAMM, Alicja; BUNSCHWELKENS, Krystyna; GUSCHELBAUER, Tadeusz; NOWICKI, Zdzislaw

A case of hemi-algodystrophy in a woman with fibrous pulmonary changes. Pol. tyg. lek. 17 no.51:1995-1999 17 D '62.

1. Z Instytutu Reumatologicznego, Oddzial w Krakowie; dyrektor: prof. dr A. Sokolowski i z Zakladu Histologii AM w Krakowie; kierownik: prof. dr J. Ackerman.

(PAIN) (MUSCULAR DYSTROPHY)

BARWIK-SCHRAM, Alicja; SOKOLOWSKI, Adam

Combined chloroquine, aspirin and prednisone therapy of progressive chronic rheumatism. Pol. tyg. lek. 18 no.5:170-173 28 Ja '63.

1. Z Instytutu Reumatologicznego w Warszawie; dyrektor: dr med. Wl. Bruhl i z Oddzialu w Krakowie; kierownik: prof. dr A. Sokolowski.

(ARTHRITIS, RHEUMATOID) (ACETYLSALICYLIC ACID)
(CHLOROQUINE) (PREDNISONE)

BARWIK-SCHRAMM, Alicja; KOLODZIEJCZYK, Adam

Behavior of adenosine triphosphoric acid (ATP) in the blood of rheumatic patients. Reumatologia (Warsz.) 3 no.2:111-115 '65.

1. Z Instytutu Reumatologicznego, Oddzial w Krakowie (Kierownik Oddzialu: prof. dr. A. Sokolowski).

BARWIK-SCHRAMM, Alicja; GOLDSZTAJN, Mieczyslaw; TRYTKO, Halina;
ZEBROWSKI, Stanislaw

Polyneuropathy in the course of reumatoid arthritis. Pol. tyg. lek. 20 no.25:937-938 21 Je '65.

1. Z Instytutu Reumatologicznego, Oddzial w Krakowie (Kierownik: prof. dr. med. A. Sokolowski) i z Kliniki Neurologicznej AM w Krakowie (Kierownik: prof. dr. Wl. Jakimowicz).

BARWIKOWA, Jaskra

Pigment glaucoma. Klin.oczna 29 no.3:233-237 '59.

1. Z Kliniki Ocznej A. M. w Gdansku Kierownik: prof. dr med. I. Abramowicz.

(GLAUCOMA case reports)

BARWINSKA, Leontyna (Lublin)

Conference of the Association of Polish town Planners on education of workers of spatial planning. Czasop geograf 34 no.3:333-334 '63.

BARWINSKA, Leontyna

A scientific session on the tenth anniversary of the death of Eugeniusz Romer. Przegl geogr 36 no.4:819-820 '64.

P.T.A 7

BARWINSKI, E.

661.32 003.2

343

Barwiński E., B. Sc. (Eng.). **Investments in the Polish Soda Industry.** „Inwestycje w przemyśle sodowym". Przemysł Chemiczny. No 12, 1949, pp. 592—595.

The author discusses the conditions and possibilities as well as the difficulties encountered in the development of the existing Polish alkali factories. Some problems of future investments are discussed on technical and organizational grounds.

BARWINSKI, E.

"Modernizing the Equipment of Production Establishments." p. 299
(CHEMIK. Vol. 7, No. 11, Nov. 1954; Katowice, Poland.)

So: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 4, April 1955, Uncl..

BARWINSKI, E.

"Standardization of Apparatus in the Chemical Industry." P. 288. (PRZEMYSL CHEMICZNY, Vol. 10, No. 6, June, 1954, Warszawa, Poland)

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 1, Jan. 1955 Uncl.

BARWINSKI, E.

POLAND/Chemical Technology - Chemical Products and Their Application, Part 1. - General Topics. H-1

Abs Jour : Ref Zhur - Khimiya, No 7, 1958, 21664

Author : E. Barwinski
Inst :
Title : Analysis of Errors in Planning Chemical Factories.

Orig Pub : Przem. chem., 1956, 12, No 11, 619-621

Abstract : The peculiarities of planning chemical factories and the possible errors connected with the incorrect choice of the location, with shortcomings in the ventilation system and in the system of disposal and purification of sewage are dealt with in the discussion paper.

d 1/1

BARWIOLEK, Jerzy, mgr.inz.; ROSA, Tadeusz, mgr.,inz.

Epoxy esters in joints of cables 6 and 15 kv. Wiad elektrotech 28 no.9:277-280 S '61.

1. Centralne Biuro Konstrukcji Kablowych,Warszawa (for Barwiolek). 2. Zaklady Wytworcze Aparatow Wysokiego Napiecia (for Rosa).

BARWIOLEK, Jerzy, mgr inz.

Prefabricated epoxy resin heads for cables with paper insulation for voltages 6, 15, and 30 kv. Wiad elektrotechn 32 no.3: 83-85 Mr'64.

1. Centralne Biuro Konstrukcji Kablowych, Warszawa.

BARWIOLEK, J., mgr inz.

Assembling electric power cables in aluminum sheathing. Wiad elektrotechn 32 no.7:189-191 Jl '64.

1. Central Office of Cable Design, Warsaw.

HUNGARY

KELLER, Laszlo, Dr, RETSAGI, Gyorgy, Dr, BARY, Lujza, Dr, GERGELY, Janos, Dr, GERO, Sandor, Dr; Medical University of Budapest, III. Medical Clinic (Budapesti Orvostudomanyi Egyeten, III. Belklinika).

"Results with Some Antilipaemic Compounds."

Budapest, Orvosi Hetilap, Vol 104, No 22, 2 June 63, pages 1024-1025.

Abstract: [Authors' Hungarian summary] The authors discuss the pathogenetical basis of antilipaemic treatment of atherosclerosis. They report their experiences gained during treatment of 159 patients suffering from coronary sclerosis with compounds having different action mechanisms. The results in terms of the number of cases treated successfully as well as in terms of the decrease in the serum lipid level were, so far, unsatisfactory. Better results can only be hoped for with the introduction or combined use of drugs with greater potency and less side effects. 3 Hungarian, 17 Western references.

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L 09047-67

ACC NR: AP6032481 SOURCE CODE: UR/0056/66/051/003/0936/0948

5b

AUTHOR: Bar'yakhtar, V. G.; Savchenko, M. A.; Tarasenko, V. V.

ORG: Physicotechnical Institute, Academy of Sciences Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

TITLE: Relaxation and thermal conduction in magnetic substances with dislocations

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 3, 1966, 936-948

TOPIC TAGS: thermal conduction, spin wave, phonon scattering, activation energy, heat equation, wave equation, magnetic substance, ferromagnetic substance, antiferromagnetic substance

ABSTRACT: A spin wave and phonon scattering have been investigated for disloca-
tions in ferromagnetic and antiferromagnetic substances. It is shown that the mean
lifetime of a spin wave in a ferromagnet is proportional to $\xi^{-1/2}T^{-1/2}$, and in an
antiferromagnet it is proportional to the $\xi^{-1/2}T^{-1}$ (for $T \gg \omega_0$), where T is
the temperature, ξ is the dislocation concentration, and ω_0 is the activation

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AKHIYEZER, A.I.; BAR'YAKHTAR, V.G.; KAGANOV, M.I.

Width of ferromagnetic resonance lines. Fiz.met. i metalloved. 6 no.5:932-934 '58. (MIRA 12:2)

1. Fiziko-tekhnicheskiy institut AN USSR.
(Ferromagnetism)

AUTHORS: Akhiyezer, A. I., Bar'yakhtar, V. G., Peletminskiy, S. V. SOV/56-35-1-31/59

TITLE: Coupled Magnetoelastic Waves in Ferromagnetics and Ferroacoustic Resonance (Svyazannyye magnitouprugiye volny v ferromagnetikakh i ferroakusticheskiy rezonans)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 35, Nr 1, pp. 228-239 (USSR)

ABSTRACT: A deviation of the magnetic moment of ferromagnetics or Seignette electrics from the equilibrium value (at a given temperature) propagates in form of waves, the dispersion characteristics of which do not differ from those of spin waves (Ref 1). In elastically deformable ferromagnetics an interaction between magnetic and elastic waves occurs as a result of magnetostriction and the ponderomotoric forces (caused by spontaneous magnetization). In the present paper the authors develop a phenomenological theory of these phenomena and determine the velocities of sound in ferromagnetics in dependence on magnetization and the applied magnetic field strength, the absorption coefficient in dependence on elec-

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SOV/56-35-1-31/59

Coupled Magnetoelastic Waves in Ferromagnetics and Ferroacoustic Resonance

tric conductivity and the relaxation of the magnetic moment, and finally they discuss the possibility of exciting magnetic waves with the aid of ultrasonics (as a result of resonance). The paper is divided into individual sections which deal with the following problems in the following order: Free energy of ferromagnetics; introduction of Maxwell's equations; the dispersion properties of magnetic waves; the absorption of magnetic waves as a result of limited conductivity and of relaxation processes; the case $\lambda \ll gM_0$; coupled and magneto-acoustic waves in ferromagnetics; coupled magneto-acoustic waves with $\lambda = 0$; coupled magneto-acoustic waves for the limiting case of high conductivity $\sigma \gg \omega c^2/c_t^2$; determination of the phase velocity of sound vibrations at $\vartheta = 0$; determination of the absorption coefficients of magneto-acoustic vibrations; disturbance of magnetic waves by external sound-fields. In conclusion, the authors thank L.D. Landau, Academician, and M.I. Kaganov for their advice and discussions.

There are 8 references, 6 of which are Soviet.

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Physics Tech Inst AS UKR SSR

SOV/56-35-3-31/61

24(5)

AUTHORS: Bar'yakhtar, V. G., Kaganov, M. I.

TITLE: Cherenkov Radiation During Passage of a Charged Particle Through a Ferrodielectric (Cherenkovskoye izlucheniye pri prokhozhdenii zaryazhennoy chastitsy cherez ferrodielektrik)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 3, pp 766-770 (USSR)

ABSTRACT: The emission of electromagnetic waves during the motion of a charged particle in a ferrodielectric (ferrite) is characterized by the dispersion properties of the ferrites. In the present paper the authors investigate the Cherenkov radiation of a charged particle moving in a medium with gyrotropic magnetic permeability. For the gyrotropic permeability tensor the following is set up:

$$\hat{\mu} = \begin{pmatrix} \mu_1 & i\mu_2 & 0 \\ -i\mu_2 & \mu_1 & 0 \\ 0 & 0 & \mu_3 \end{pmatrix}$$

with growing frequencies ω the μ_1 and μ_3 tend towards 1, whereas μ_2 tends towards 0 (already at comparatively low fre-

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SOV/56-35-3-31/61

Cherenkov Radiation During Passage of a Charged Particle Through a Ferrodielectric

quencies (Ref 1), in ferrites at about $\omega \sim 10^{10} \div 10^{11}$ $\sec^{-1}$). With this gyrotropy Cherenkov radiation may occur at any particle velocities, no matter how low they may be. μ, however, does not supply a complete description of dispersion properties, because it does not take the possible propagation of spin waves into account, the excitation of which may occur practically at any particle velocities. The energy losses of the particle, which are connected with this excitation, are of the character of polarization losses. The present paper aims at investigating the influence exercised by the gyrotropic tensor μ upon the energy losses during the motion of a charged particle in a ferrite. The investigation is restricted to a motion along the gyrotropy axis (z-axis). A similar investigation was carried out already by Kolomenskiy and Sitenko, who, however, took only the gyrotropy of the electric and not that of the magnetic properties into account (Ref 3). Sitenko and Pafomov (Refs 4,5) took the influence exercised by the magnetic properties upon the Cherenkov radiation into account. The gyrotropy of electric properties in ferrites occurs in frequen-

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cy ranges that depend on the electron dispersion $\hat{\varepsilon}$; these ranges differ from those in which $\hat{\mu}$-gyrotropy occurs. For the intensity of Cherenkov radiation dW/dz formulae according to Landau and Lifshits (Ref 1) as well as according to Sitenko (Ref 4) are given; for the Cherenkov radiation in the r-f region ($\lambda > 0{,}1 \div 1$ mm) a formula is given also for dW/dz (Ref 7), which is

$$\frac{dW}{dz} = -\frac{e^2}{c^2}\int_{I}(\ldots)\,\omega d\omega - \frac{e^2}{2c^2}\int_{II}(\ldots\ldots\ldots\ldots)\,\omega d\omega$$

In the (...) very complicated functions of ω, ω_1, β, ε, and μ_0 are partly found, where μ_0 is the value of $\mu_1(\omega)$ at $\omega = 0$. $(\lambda \ll \omega_0)$. Furthermore, the integration of this equation is dealt with. In the last chapter the energy losses due to excitation of spin waves by the particle are calculated. As the coupling of electromagnetic and spin waves is weak, calculation of the excitation intensity of spin waves can be carried out by means of an expansion in series. The corresponding equations for

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Cherenkov Radiation During Passage of a Charged Particle Through a Ferrodielectric

dW/dz are given. For the order of magnitude of the potential losses $dW/dz \approx -(e^2/c^2)\omega_p^2$ is obtained, where $\omega_p^2 = 4\pi Ne^2/m$ ($\omega_p \sim 10^{15}$ sec^{-1}) and for the ratio between loss due to excitation of spin waves and losses due to polarization it holds that $(gM/\omega_p)(\theta_c/\hbar\omega_p) \ll 1$. In conclusion the authors thank A. I. Akhiyezer for raising the problem and discussing the results obtained. There are 1 table and 9 references, 8 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-Technical Institute of the Academy of Sciences, Ukrainskaya SSR)

SUBMITTED: April 21, 1958

Card 4/5

BAR'YAKHTAR, V. G.: Master Phys-Math Sci (diss) -- "On the theory of relaxation processes in ferro-dielectrics". Khar'kov, 1959. 7 pp (Min Higher Educ Ukr SSR, Khar'kov Order of Labor Red Banner State U im A. M. Gor'kiy), 150 copies (KL, No 11, 1959, 114)

BAR'YAKHTAR, V.G.

SOV/30-59-2-42/60

24(0)

AUTHOR: Khalatnikov, I. M., Doctor of Physical and Mathematical Sciences

TITLE: Investigations of Low-temperature Physics (Issledovaniya po fizike nizkikh temperatur)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 2, pp 98-100 (USSR)

ABSTRACT:
The 5th All-Union Conference on this problem took place in
Tbilisi from October 27 to November 1, 1958. It was attended by
physicists from Moscow, Khar'kov, Leningrad, Tbilisi,
Sverdlovsk, and Kiyev. 4 fields of low-temperature physics were
discussed: superliquidity of liquid helium II, supraconductivity,
antiferromagnetism, magneto-resistive effect. The following
reports and communications were heard: A. A. Abrikosov, L. P.
Gor'kov reported on the investigation of the properties of
supraconductive alloys. A. A. Abrikosov, L. P. Gor'kov, I. M.
Khalatnikov spoke of properties of supraconductors in the high-
frequency magnetic field. D. V. Shirkov and Chen' Chan'-yan'
and Chzhou Si-shin', two young Chinese scientists working at
Moscow University, described investigations for determination
of the influence exercised by the Coulomb (Kulon) interaction
of charges on supraconductivity. V. V. Tolmachev explained the
nature of the so-called collective excitations of the Bose
type in supraconductors. D. N. Zubarev, Yu. A. Tserkovnikov

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spoke of the thermodynamics of supraconductors and B. T.
Geylikman. V. Z. Kresin of the thermal conduction of supra-
conductors. Yu. V. Sharvin, V. P. Gantmakher reported on ex-
perimental work with supraconductors. N. V. Zavaritskiy spoke
of the measurement of the anisotropy of thermal conductivity in
the supraconductive state. In a series of reports problems of
the superliquidity of helium were discussed, which was discover-
ed in 1938 by P. L. Kapitsa and the theory of which was set up
in 1941 by L. D. Landau. E. L. Andronikashvili and his col-
laborators investigated the properties of rotating helium.
V. P. Peshkov spoke of the effect of the formation of the
boundary between superliquid and non superliquid helium. Guan
Vey-yan', collaborator of the Institut fizicheskikh problem
(Institute of Physical Problems) investigated the properties of
the so-called jump in temperature of Kapitsa. I. M. Lifshits,
V. G. Peschanskiy investigated galvanomagnetic phenomena in
strong magnetic fields for metals with open Fermi surfaces.
N. Ye. Alekseyevskiy, Yu. P. Gaydukov experimentally investi-
gated the resistance anisotropy of gold monocrystals in the
magnetic field. L. S. Kan, B. G. Lazarev combine the presence of
a temperature minimum with the structural state of the metal.
M. Ya. Azbel' reported on the quantum theory of metallic con-
ductivity in the alternating electromagnetic and constant mag-
netic field. A. S. Borovik-Romanov reported on the weak ferro-
magnetism in antiferromagnetic samples of $MnCO_3$. N. M. Kreynes,

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Ye. A. Turov investigated the magnetic anisotropy of the anti-
ferromagnetic monocrystals $CuSO_4$ and $CoSO_4$. R. A. Alikhanov
reported on neutronographic investigations of antiferromagnetics.
Ye. I. Kondorskiy and collaborators reported on the suscepti-
bility of nickel and nickel-copper alloys at low temperatures.
M. I. Kaganov, V. M. Tsukernik reported on kinetic phenomena in
ferromagnetics at low temperatures. A. I. Akhiyezer, V. G.
Bar'yakhtar, and S. V. Peletminskiy spoke of computations of the
relaxation of the magnetic moment in ferromagnetic dielectrics
at low temperatures. T. I. Sanadze spoke of observation re-
sults of paramagnetic resonance of terbium in the $TbNO_3 \cdot 6H_2O$
nitrate. G. R. Khutsishvili gave a theoretical analysis of the
orientation of the nuclear spin in the Overhauser (Overkhauzer)
effect in nonmetals. B. N. Samoylov, S. M. Reynov and collabora-

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tors reported on obtaining orientated nuclei. N. V. Bulatova,
V. S. Kogan and B. G. Lazarev showed that hydrogen isotopes in
solid state have different structures. I. A. Gindin, B. G.
Lazarev, Kh. D. Starodubov and V. I. Khotkevich detected poly-
morphism in a number of metals at low temperatures. E. L.
Andronikashvili, V. P. Peshkov and M. P. Malkov reported on the
stage of development of foreign scientific research work in the
field of low-temperature physics. At the end of the Conference
P. L. Kapitsa spoke of his successful development of investi-
gations in the field of low-temperature physics. The partici-
pants of the Conference visited the Institut fiziki Akademii
nauk Gruzinskoy SSR (Physics Institute of the Academy of Sciences
of the Gruzinskaya SSR) and the Physics Faculty of Tbilisi
University as well as the building of the new research atomic
reactor near Tbilisi.

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V. BARYAKHTAR

SOV/53-67-4-7/7

21(0)
AUTHOR: Chentsov, R.

TITLE: The Fifth All-Union Conference on the Physics of Low Temperatures (5-ye Vsesoyuznoye soveshchaniye po fizike nizkikh temperatur)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 67, Nr 4, pp 743-750 (USSR)

ABSTRACT: This Conference took place from October 27 to November 1 at Tbilisi; it was organized by the Otdeleniye fiziko-matematicheskikh nauk Akademii nauk SSSR (Department of Physico-mathematical Sciences of the Academy of Sciences, USSR), the Akademiya nauk Gruzinskoy SSR (Academy of Sciences, Gruzinskaya SSR), and the Tbilisskiy gosudarstvennyy universitet im. Stalina (Tbilisi State University imeni Stalin). The Conference was attended by about 300 specialists from Tbilisi, Moscow, Khar'kov, Kiyev, Leningrad, Sverdlovsk, and other cities as well as by a number of young Chinese scientists at present working in the USSR. About 50 lectures were delivered which were divided according to research fields. ... IV. Magnetism. A. S. Borovik-Romanov (IFP) delivered a report on investigations he carried out of the anisotropy of the weak ferromagnetism in monocrystal samples of the antiferromagnetic MnCO$_3$ (the effect of anisotropy was predicted by the thermodynamical theory developed by Dzyaloshinskiy). In the course of the discussion R. A. Alikhanov (IFP) spoke about neutronographical investigations he carried out of the magnetic structure of MnCO$_3$ and FeCO$_3$ at low temperatures. P. L. Kapitsa stressed the importance of the method based upon Dzyaloshinskiy's theory. N. M. Kreynes (VNIIFTRI), whose lecture was read by A. S. Borovik-Romanov, reported on measurements carried out by him (in the IFP) of the magnetic anisotropy of the antiferromagnetic CuSO$_4$- and CoSO$_4$-monocrystals.

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Ye. A. Turov (IFM AN SSSR, Sverdlovsk) spoke about his theoretical investigations of the magnetizability, the susceptibility, the specific heat, and the resonance frequencies of antiferromagnetics and weak ferromagnetics. A. I. Sudovtsov and Ye. Ya. Semenenko (KhFTI) spoke about measurements of the electric resistance of iron in magnetic fields in a wide temperature range with simultaneous plotting of the magnetization curve. N. V. Vol'kenshteyn, G. V. Fedorov, E. V. Galoshina and M. I. Turchinskaya (IFM AN SSSR) spoke about measurements of magnetization and the Hall effect of polycrystalline samples, nickel and Ni$_3$Mn at low temperatures. Ye. I. Kondorskiy, V. Bede, V. Gofman and Chang, Shou-ch'un (MGU) gave a report on susceptibility measurements on nickel and its alloys with copper at low temperatures; T. I. Sanadze (TGU) spoke about the spectrum of the paramagnetic resonance of Tb^{3+} in terbium nitrate at temperatures of liquid hydrogen. M. I. Kaganov and V. M. Tsukernik (KhFTI) dealt with the kinetic phenomena in ferromagnetics at low temperatures and with calculation of relaxation time; A. I. Akhiyezer, V. Bar'yakhtar and S. Peletminskiy (KhFTI) carried out a theoretical investigation of the relaxation of the magnetic moment in ferrodielectrics; Vlasov (IFM AN SSSR) showed that a linearly polarized elastic (ultrasonic) wave of a frequency of 10^9 cycles when passing through a ferromagnetic substance in the direction of the magnetic field, is subjected to a turn of the polarization plane of the order of 10^{-3} - 10^{-4} radian/cm oersted. M. I. Kaganov pointed out that in this connection yet another phenomenon may be observed, namely the resonance absorption of ultrasonics if the wavelength is equal to the radius of the Larmor orbit of the electron. - V. Various Questions. One of the most interesting lect

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24(3)
SOV/56-36-1-29/62

AUTHORS: Akhiyezer, A. I., Bar'yakhtar, V. G., Peletminskiy, S. V.

TITLE: On the Theory of Relaxation Processes in Ferroelectrics at Low Temperatures (K teorii relaksatsionnykh protsessov v ferrodielektrikakh pri nizkikh temperaturakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 1, pp 216-223 (USSR)

ABSTRACT: The authors developed a theory of the relaxation of the magnetic moment of a ferrorelectric and showed that, because of the exchange interaction between the spin waves, above all the Bose distribution of the spin waves with the given nonequilibrium values of the square and the projection of the magnetic moment on to the axis of the slightest magnetization occurs. The Hamiltonian of interaction among spin waves and between spin waves and phonons can be represented in the form $\mathcal{H}_{int} = \mathcal{H}_e + \mathcal{H}_w + \mathcal{H}_a + \mathcal{H}_p$. Here $\mathcal{H}_e$ and $\mathcal{H}_w$ denote the Hamiltonians of exchange interaction and magnetic interaction respectively, $\mathcal{H}_a$ - the energy of anisotropy, and $\mathcal{H}_p$ - that Hamiltonian which describes the interaction between spin waves and phonons. When

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SOV/56-36-1-29/62

On the Theory of Relaxation Processes in
Ferroelectrics at Low Temperatures

determining $\mathcal{H}_e$ it is necessary to proceed from the expression for the exchange energy of the ferromagnetic:

$$\mathcal{H}_e = \frac{\alpha}{2}\int \frac{\partial M_l}{\partial x_i}\frac{\partial M_l}{\partial x_i}\, dV,$$

where M is the magnetic moment of the volume unit and α is the exchange integral. In the following, the expressions for $\mathcal{H}_w$, $\mathcal{H}_a$, and $\mathcal{H}_p$ are written down. The authors then give the formulas for the variation of the number of spin waves with the momentum $\vec{k}$ in the unit of time, which are caused by the above-mentioned interactions. By using expressions for the collision operators, it is possible to determine the mean probabilities of the various processes of interaction between spin waves and phonons. Above all, the average probabilities for spin wave - spin wave scattering (due to exchange interaction), of the splitting up of a spin wave into two, and of the fusion of two spin waves into one, are written down. The probabilities of the other processes are lower than those of the two last-mentioned. An equation,

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On the Theory of Relaxation Processes in Ferroelectrics at Low Temperatures

which is given, determines the quantity of heat transferred from the spin system to the lattice, and a further equation is the law for the conservation of energy. Also relaxation times are calculated. The authors finally thank Academician L. D. Landau and M. I. Kaganov for their valuable suggestions. There are 5 references, 4 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-Technical Institute of the Academy of Sciences, Ukrainskaya SSR)

SUBMITTED: July 5, 1958

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24 (3)

SOV/56-37-3-17/62

AUTHOR: Bar'yakhtar, V. G.

TITLE: Contribution to the Theory of the Relaxation of the Magnetic Moment in Ferrodielectrics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3 (9), pp 690-694 (USSR)

ABSTRACT: Together with Akhiyezer and Peletminskiy (Ref 1) the author already investigated the relaxation of the magnetic moment in ferrodielectrics within the temperature range of $\theta_c \gg T \gg \theta_c(\mu M_0/\theta_c)^{4/7}$ (μ is Bohr's magneton, and M_0 the equilibrium magnetic moment per unit of volume, and θ_c - Curie temperature), and calculated the relaxation constants. The present paper intends to carry out a closer investigation of the setting of the amount magnetic moment and of the setting of a temperature equilibrium between lattice and spin waves, it being assumed in the latter case that the magnetic moment does not deviate from the direction of equilibrium. Also the relaxation of the magnetic moment and the temperature levelling in ferrodielectrics at $T \ll \theta_1$ ($\theta_1 = \theta_c(\mu M_0/\theta_c)$ are determined.

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Contribution to the Theory of the Relaxation of the Magnetic Moment in Ferrodielectrics

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For this purpose the equation of motion for the distribution function of the spin waves serves as a basis; the mode of denotation is given in reference 1 and is not again defined here. For $T \gg \theta_1$ there follows first the setting of a Bose distribution corresponding to a nonequilibrium magnetic moment, next there follows an equilibrium value of the magnetic moment, and finally the magnetic moment turns into its equilibrium direction. For $T \ll \theta_1$ the equilibrium value of the magnetic moment sets in simultaneously with the setting of the Bose distribution of the spin waves, and only then the magnetic moment turns into its equilibrium direction. For the setting of a temperature equilibrium between spin waves and lattice for the determination of the relaxation of the magnetic moment, simple formulas are given. The author finally thanks S. V. Peletminskiy for his assistance, and A. I. Akhiyezer and M. I. Kaganov for valuable discussions. There are 4 Soviet references.

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Physics-Tech Inst AS UKR SSR

84592

S/181/60/002/010/014/051
B019/B056

9.4300 (1143,1144,1138)

AUTHORS: Akhiyezer, A. I. and Bar'yakhtar, V. G.

TITLE: Theory of the Heat Conductivity of Ferrodielectrics at Low Temperatures

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2446-2449

TEXT: As shown in an earlier paper (Ref. 1), the spin waves make a considerable contribution to the heat flow in ferrodielectrics at low temperatures. There, only one kind of interaction of spin waves was, however, taken into account, namely the merging of two spin waves into one, and the division of one spin wave into two. Simultaneously with this interaction, the "volume" scattering of spin waves by spin waves plays an essential part. In the present paper this kind of interaction is investigated and at the same time inaccuracies in previous papers are eliminated (Refs. 1,2). In this case, the authors proceed from the kinetic equations (1) for the determination of the change in the number of spin waves and phonons in the case of a small temperature gradient,

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Theory of the Heat Conductivity of
Ferrodielectrics at Low Temperatures

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and obtain the solutions

$$n_{\vec{k}} = n^0_{\vec{k}} + n^0_{\vec{k}}(n^0_{\vec{k}} + 1)\,\varphi_{\vec{k}}/T$$

$$N_{\vec{k}j} = N^0_{\vec{k}j} + N^0_{\vec{k}j}(N^0_{\vec{k}j} + 1)\,\Phi_{\vec{k}}/T \qquad (2)$$

$n^0_{\vec{k}}$ and $N^0_{\vec{k}j}$ are equilibrium Bose functions. For the collision operators $\mathcal{L}_0(\varphi) + \xi\mathcal{L}_u(\varphi) = n^0(n^0 + 1)\frac{\varepsilon}{T}(\vec{v},\nabla T)$ (3) is obtained. Here ξ is a small parameter, which gives the probability of transfer processes. Proceeding from (3), the operators for the collision of spin waves among themselves, for the collision of phonons among themselves, and the collision of spin waves with phonons are investigated. From an investigation of the limiting cases, expressions are obtained for the heat conduction coefficient, from which it may be seen that for $\Theta_D \gg \Theta_C$ and $T \ll \Theta_D^2/\Theta_C$, the main part in heat conduction is played by the spin waves, because $c_s \gg c_1$. If, however, $\Theta_D \gg T \gg \Theta_D^2/\Theta_C$, then the heat is

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Theory of the Heat Conductivity of Ferrodielectrics at Low Temperatures

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transferred by phonons. $c_l \gg c_s$. Here Θ_D is the Debye temperature, Θ_C - the Curie temperature. c_s and c_l are the specific heats of the spin waves and the lattice respectively. There are 3 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR Khar'kov (Institute of Physics and Technology of the AS UkrSSR, Khar'kov)

SUBMITTED: April 4, 1960

X

Card 3/3

9.4300 (1035, 1138, 1143)

83735

S/056/60/038/004/028/048
B006/B056

24.7800

AUTHORS: Bar'yakhtar, V.G., Urushadze, G. I.

TITLE: The Theory of Relaxation Processes in Ferrodielectrics With Weak Magnetic Anisotropy at Low Temperatures

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 4, pp. 1253 - 1262

TEXT: A. A. Akhiyezer, V. Bar'yakhtar, and S. Peletminskiy (Ref. 1) developed a general theory of the relaxation of the magnetic moment in ferrodielectrics, which is based upon the fact that two kinds of interaction occur between the spin waves: A strong exchange interaction and a weak relativistic interaction (magnetic dipole interaction and interaction due to magnetic anisotropy). Details concerning these reactions are discussed by way of introduction. Many ferrites which may be considered to be dielectrics at low temperatures, have a complex magnetic structure, i.e. they have several magnetic sublattices. The consequence is that, besides the low-frequency (activation-less) branch in the magnetic energy spectrum also high-frequency branches (with high

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The Theory of Relaxation Processes in Ferrodielectrics With Weak Magnetic Anisotropy at Low Temperatures

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activation energies) occur. The contributions of these branches to the thermodynamic and kinetic properties are at low temperatures exponentially small. An analysis shows that the interaction between the low-frequency spin waves due to energy exchange between the sublattices of the same order is similar to the relativistic interaction describing the reciprocal scattering of spin waves. Thus, the magnetic structure may be neglected when investigating the relaxation processes in ferrodielectrics with low anisotropy. The ferrodielectrics, for which the relaxation of the magnetic moment and the leveling of spin and lattice temperature is investigated here, are in a weak magnetic field. Establishment of the equilibrium of the magnetic moment with respect to value and direction is due to magnetic dipole interaction, with the absolute value of the magnetic moment coinciding as to order of magnitude with the time of rotation of the magnetic moment toward equilibrium direction. Also the leveling time of spins and of the lattice are calculated. In an appendix a ferrodielectric having two magnetic sublattices is studied. Finally, the authors thank A. I. Akhiyezer for his advice, and M. I. Kaganov and V. M. Tsukernik for discussions. There are 9 references: 6 Soviet and

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83735

The Theory of Relaxation Processes in Ferrodielectrics With Weak Magnetic Anisotropy at Low Temperatures

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2 US.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences, Ukrainskaya SSR)

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SUBMITTED: November 4, 1959

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BAR'YAKHTAR, V.G.; URUSHADZE, G.I.

Scattering of spinor waves and phonons on impurities in ferrodielectrics. Zhur. eksp. i teor. fiz. 39 no.2:355-361 Ag '60.
(MIRA 13:9)

1. Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR.
(Ferroelectric substances) (Scattering (Physics))

83763
S/056/60/039/003/015/045
B006/B063

9.4300 (1035,1138,1143)

AUTHORS: Bar'yakhtar, V. G., Peletminskiy, S. V.

TITLE: The Theory of Relaxation of the Magnetic Moment in Ferromagnetics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 3(9), pp. 651-656

TEXT: Relaxation effects in ferromagnetics are due to various interaction processes between spin waves and conduction electrons. The sd-exchange interaction between spin waves and conduction electrons attains a maximum in the temperature range $\Theta_C \gg T \gg 4\Theta_C(Ja/\hbar v_0)^2$, where J is the sd-exchange integral, a the lattice constant, and v_0 the limiting Fermi velocity. This exchange interaction causes a quasi-equilibrium distribution of conduction electrons and spin waves, which corresponds to a certain magnetic moment of the body. The present paper shows that this quasi-equilibrium distribution is established with a given non-equilibrium value of the projection of the magnetic moment onto the axis of easiest magnetization. Only there-

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The Theory of Relaxation of the Magnetic Moment in Ferromagnetics

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upon the equilibrium value of the magnetic moment is gradually attained as a result of a relativistic spin-orbit interaction between spin waves and conduction electrons. As this interaction is weak as compared to the sd-exchange interaction, the relaxation of the magnetic moment takes place slowly as compared to the establishment of the quasi-equilibrium distribution function. With $v_0 \sim 10^8$ cm/sec, $\Theta_c \sim 10^3\ ^\circ K$, $\varepsilon_0 \sim 1^\circ K$, $n = 10^{22}\ \mathrm{cm}^{-3}$, and $a \sim 10^{-8}$ cm one obtains the relaxation time of the projection of the magnetic moment onto the axis of easiest magnetization as being of the order of $10^{-8} - 10^{-9}$ sec. The relaxation time is found to be independent of temperature: $\frac{1}{\tau} \approx \frac{8(\pi^2-8)}{3\cdot 137}\left(\frac{v_0 k_0}{cq}\right)^2 \frac{c}{v_0}\left(\frac{\varepsilon_0 \Theta_c}{E^{*2}}\right)^{1/2} \frac{\mu M_0}{\hbar}$. The authors thank A. I. Akhiyezer for discussions and for having suggested this work, and M. I. Kaganov also for discussions. There are 4 references: 3 Soviet and 1 US.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences Ukrainskaya SSR)

SUBMITTED: March 23, 1960

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86920

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24.7900 (1035,1055,1160,1144)

AUTHORS: Bar'yakhtar, V. G., Maleyev, S. V.

TITLE: Scattering of Slow Neutrons in Ferrites and Antiferromagnetics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 5(11), pp. 1430 - 1436

TEXT: The cross sections for elastic scattering of neutrons in antiferromagnetics and ferrites and the cross sections for neutron scattering involving emission or absorption of a single spin wave are calculated by means of a phenomenological spin wave method. The former lead to the conclusion that there is a temperature dependency of the Bragg peaks while the latter lead to the intensity of these peaks in the case of single quantum scattering. The following equation is obtained for antiferromagnetics:

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$$\frac{d\sigma_o}{d\Omega} = r_o^2\gamma_o^2 \frac{(2\pi)^3}{v_o}\sum_{\tau}\delta(\vec{q}+\vec{\tau})\frac{1}{n}\sum_{\nu\nu'}\left[\vec{\xi}_{\nu}\vec{\xi}_{\nu'} - (\vec{e}\vec{\xi}_{\nu})(\vec{e}\vec{\xi}_{\nu'})\right] S_{\nu}S_{\nu'}F_{\nu}(q)F^{*}_{\nu'}(q)\cdot$$

$$\cdot\exp\left\{i\vec{q}(\vec{r}_{\nu} - \vec{r}_{\nu'})\right\}\exp\left\{-W_{\nu q} - W_{\nu' q}\right\}\left[1 - G_{\nu}(T) - G_{\nu'}(T)\right];$$ where

$S_{\nu} = v_o M_{o\nu}/n\mu$ denotes the effective atomic spin of the sublattice; $\exp\left\{-W_{\nu q}\right\}$ is the thermal factor of the atoms of the sublattice; $G_{\nu}(T) \ll 1$; ξ_{ν} - unit vector in the direction of the magnetization of the sublattice; v_o - volume of the lattice unit, μ - electron magnetic moment, r_o - classical electron radius, γ_o - neutron magnetic moment, and $\vec{\tau}$ is the vector of the reciprocal lattice multiplied by 2π. ν denotes the atoms of the lattice unit. If the scatterer is made up of two sublattices magnetized in the opposite direction then:

$$\frac{d\sigma_o}{d\Omega} = r_o^2\gamma_o^2 S^2 \frac{(2\pi)^3}{v_o}\left|F(q)\right|^2\cdot\left[1-2G(T)\right]e^{-2W_q}\sum_{\tau}\delta(\vec{q}+\vec{\tau})(1-e_z^2)(1+\cos\vec{r}_{12}\vec{\tau});$$

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e_z is the projection of the vector $\vec{e}$ ($\vec{e} = \vec{q}\vec{q}^{-1}$, $\vec{q}$ - transferred momentum). The following equation is obtained for ferrites:

$$\frac{d\sigma_o}{d\Omega} = \frac{1}{2} r_o^2 \gamma_o^2 \frac{(2\pi)^3}{v_o} \left\{ S_1^2 \left| F_1(q) \right|^2 \left[1-2G_1(T)\right] e^{-2W_{1q}} + S_2^2 \left| F_2(q) \right|^2 \left[1-2G_2(T)\right] \right.$$

$$\times\ e^{-2W_{2q}} - 2S_1S_2\left[1-G_1(T)-G_2(T)\right]$$

$$\left. \times\ e^{-W_{1q}-W_{2q}} \operatorname{Re} F_1(q)F_1^*(q)e^{i(q,\ r_1-r_2)} \right\} \sum_{\tau} \delta(q+\tau)(1-e_z^2) \qquad (11)$$

$G_\nu(T)$ is according to the spin wave theory of antiferromagnetics

$$G(T) = \begin{cases} \dfrac{\gamma\mu^2}{12a^3\theta_c}\left(\dfrac{T}{\theta_c}\right)^2, & \dfrac{\mu M_0\sqrt{2\beta\gamma}}{T} \ll 1. \\ \dfrac{\gamma\mu^2}{\pi^2 a^3\theta_c}\left(\dfrac{T}{\theta_c}\right)^2\left(\dfrac{2\mu M_0\sqrt{2\beta\gamma}}{T}\right)^{3/2}\exp\left\{-\dfrac{\mu M_0\sqrt{2\beta\gamma}}{T}\right\}, & \dfrac{\mu M_0\sqrt{2\beta\gamma}}{T} \gg 1. \end{cases}$$

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and for ferrites

$$G_{1,2}(T) = \frac{\mu M_{o(1,2)}\Gamma(3/2)\zeta(3/2)}{4\pi^2 a^3 \, (M_{10}-M_{20})^2}\left(\frac{T}{\theta_c}\right)^{3/3}$$

; β is the magnetic anisotropy constant, $\gamma \sim \theta_c/\mu M_o$. The neutron scattering cross section (in the case of emissio or absorption of one spin wave) is given by

$$\frac{d\sigma_{\pm 1,2}}{d\Omega\, dE'} = \frac{r_0^2 \gamma_0^2}{4}\sqrt{S_1 S_2}\int dk\, \frac{p'}{p}\sum_{\tau}\delta(q \mp k + \tau)\left(n_{1,2} + \frac{1}{2} \pm \frac{1}{2}\right)\times$$
$$\times\{u_k^2 |F_1(q)|^2 e^{-2W_{1q}} + v_k^2 |F_2(q)|^2 e^{-2W_{2q}} - \qquad (18)$$
$$- 2u_k v_k e^{-W_{1q}-W_{2q}} \mathrm{Re}\, F_1(q) F_2^*(q) e^{i\tau(r_1-r_2)}\}(1 + e_z^2)\,\delta(E - E' \mp \varepsilon_{1,2}(k)),$$
$$n_{1,2}(k) = [\exp\{\varepsilon_{1,2}(k)/T\} - 1]^{-1}.$$

If $a|\vec{q} + \vec{\tau}| \ll 1$ (a - lattice parameter) so is for the antiferro-

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magnetics:

$$\frac{d\sigma^{\tau}_{\pm 1,2}}{d\Omega\, dE'} \approx \frac{1}{4} S r_0^2 \gamma_0^2 \frac{p'}{p} \frac{4\mu M_0}{\varepsilon (\mathbf{q}+\boldsymbol{\tau})} \left[n_{1,2}(\mathbf{q}+\boldsymbol{\tau}) + \frac{1}{2} \pm \frac{1}{2} \right] |F(\boldsymbol{\tau})|^2 e^{-2W_\tau} \times$$
$$\times (1 - \cos \mathbf{r}_{12}\mathbf{q})(1+\tau_z^2)\, \delta[E - E' \mp \varepsilon_{1,2}(\mathbf{q}+\boldsymbol{\tau})] \qquad (19)$$

and for ferrites:

$$\frac{d\sigma^{\tau}_{\pm 1,2}}{d\Omega dE'} \approx r_0^2 \gamma_0^2 \frac{\sqrt{S_1 S_2}}{4(S_1 - S_2)} \frac{p'}{p} \left[n_{1,2}(\mathbf{q}+\boldsymbol{\tau}) + \frac{1}{2} \pm \frac{1}{2} \right] \{ S_1 |F_1(\boldsymbol{\tau})|^2 e^{-2W_{1\tau}} +$$
$$+ S_2 |F_2(\boldsymbol{\tau})|^2 e^{-2W_{2\tau}} - 2\sqrt{S_1 S_2}\, \mathrm{Re}\, F_1(\boldsymbol{\tau}) F_2^*(\boldsymbol{\tau}) e^{i(\mathbf{r}_1 - \mathbf{r}_2, \boldsymbol{\tau})} e^{-W_{1\tau} - W_{2\tau}} \} \times$$
$$\times (1+\tau_z^2)\, \delta[E - E' \mp \varepsilon_{1,2}(\mathbf{q}+\boldsymbol{\tau})] \qquad (20)$$

The authors thank A. I. Akhiyezer for suggesting this topic and his interest. A. S. Borovik-Romanov is mentioned. There are 18 references: 10 Soviet, 6 US, 1 British, and 1 Dutch.

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Scattering of Slow Neutrons in Ferrites and Antiferromagnetics

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B006/B077

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR (Leningrad Institute of Physics and Technology of the Academy of Sciences USSR). Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences Ukrainskaya SSR)

SUBMITTED: July 2, 1960

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S/053/60/071/004/001/004
B004/B056

AUTHORS: Akhiyezer, A. I., Bar'yakhtar, V. G., Kaganov, M. I.

TITLE: Spin Waves in Ferromagnetics and Antiferromagnetics I

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 71, No. 4, pp. 533 - 579

TEXT: The present paper deals with the essential properties of the energy spectrum of a ferromagnetic near magnetic saturation. The following properties depend on this spectrum at low temperatures: The interrelation between the magnetization of the ferromagnetic and temperature as well as with the external magnetic field; the thermal properties of the ferromagnetic, the relaxation of the magnetic moment, and the behavior of the ferromagnetic in electromagnetic alternating fields and in sound fields. In crystals, the deviation of the magnetic moment of an atom from the predominant direction does not remain localized on the atom, but it propagates as a wave, which is called spin wave. In the present paper, the ferromagnetic theory is dealt with as follows from the viewpoint of the spin waves: I. Energy spectra, thermal and magnetic

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properties of ferromagnetics and antiferromagnetics. 1) Spin waves in ferromagnetics. Definition of the microscopic theory of spin waves. 2) The phenomenological theory of spin waves. (The spin wave is defined as an oscillation of the magnetic moment of the ferromagnetic). 3) Derivation of the quantum theory of spin waves by proceeding from the phenomenological Hamiltanian of the ferromagnetic. 4) The high-frequency properties of ferromagnetics and ferromagnetic resonance. Here, the natural oscillations of the magnetic moment are investigated in finite samples, whose dimensions are considerably smaller than the damping length. This condition does not apply to massive ferromagnetic metals because of the skin effect, and therefore 5) deals with surface impedance. 6) Coupled magnetic and elastic waves and ferroacoustic resonance. In 7) the energy spectrum of antiferromagnetics is investigated by means of the phenomenological method. 8) Thermal and magnetic properties of ferromagnetics. From the spin-wave spectrum the magnetic moment of the ferromagnetic may be determined as a function of temperature and of the magnetic field, as well as the contribution made by the spin waves to the thermodynamic parameters of the ferromagnetic. In a similar manner, 9) deals with the thermal and magnetic properties of antiferro-